

SECTION 1 - INTRODUCTION	1-1
1.1 Purpose of Guideline	1-1
1.2 Scope and Applicability	1-1
1.2.1 Project Overview	1-2
1.2.2 EPA EDI Objectives	1-4
1.3 Responsible Entity	1-6
1.4 Introduction to EDI	1-7
1.5 How to Use the Implementation Guideline	1-7
1.6 References	1-7
SECTION 2 - BUSINESS ISSUES	2-1
2.1 Implementation Considerations	2-1
2.1.1 Establishing an EDI Committee	2-1
2.1.2 Implementation Suggestions	2-1
2.1.3 EDI Cost Justification	2-4
2.1.4 Strategy for Implementation	2-4
2.1.5 Transaction Sets	2-5
2.1.6 Pilot Program	2-5
2.1.7 Education	2-6
2.2 Timing of Transactions	2-6
2.3 Modes of Operation	2-7
2.4 Security	2-7
2.5 Backup and Recovery Procedures	2-9
2.5.1 Disaster Recovery Considerations	2-10
2.6 Audit Considerations	2-10
SECTION 3 - LEGAL CONSIDERATIONS	3-1
3.1 General Introduction	3-1
3.2 Record Keeping	3-3
3.3 Authentication	3-3
3.4 Trading Partner Agreement	3-4
3.5 Third-Party Agreements	3-5
3.6 Laws, Rules, and Regulations	3-6
SECTION 4 - ENVIRONMENTS	4-1
4.1 System Architecture	4-1
4.2 Application Integration	4-1
4.3 Translation	4-3
SECTION 5 - MAINTENANCE	5-1
5.1 Maintaining Guidelines	5-1
5.2 Maintaining X12 Standards	5-1

5.3	Version/Release	5-2
SECTION 6 - COMMUNICATIONS		
6.1	General Introduction	6-3
6.1.1	EDI Communication Alternatives	6-4
6.2	Protocols	6-4
6.2.1	EDI Data Transfer Protocol	6-4
6.2.2	Transmission Protocols	6-6
6.3	Point-to-Point	6-7
6.4	Third-Party Services	6-7
6.5	Network Interconnects	6-9
SECTION 7 - MISCELLANEOUS		
7.1	Industry Business Models	7-1
7.1.1	Introduction	7-1
7.1.2	Transaction Sets	7-1
7.2	Related Industry Topics	7-4
7.3	EDI Vendor References	7-4
SECTION 8 - GLOSSARY OF TERMS		
SECTION 9 - FORMS AND DOCUMENTS		
SECTION 10 - AGENCY CONVENTIONS,INTERCHANGE CONTROL & TRANSACTION		
SETS	10-1
10.1	Introduction	10-1
10.2	X12 EDI Transmission Control Structure	10-4
10.2.1	Control Segments	10-7

SECTION 1 - INTRODUCTION

1.1 Purpose of Guideline

This implementation guideline is provided by the Environmental Protection Agency (herein referred to as EPA, or the Agency). It presents an overview of the EPA and Electronic Data Interchange (EDI). EDI is the transmission, in American National Standards Institute, Accredited Standards Committee X12 (ANSI ASC X12) standard syntax, of unambiguous information of business or strategic significance between computers of independent organizations. Other acceptable identifications of this standard are ASC X12, ANSI X12, or X12.

1.2 Scope and Applicability

This Implementation Guideline is intended to provide prospective EDI Trading Partners, both internal and external to the EPA, with the information necessary to understand the EDI goals of the EPA; an overview of the current EDI projects; and the references to the individual Program Office publications. The individual publications for each Program Office contain the specifics for conducting business with the EPA using EDI and the necessary cross references to this document.

1.2.1 Project Overview

The EPA is actively supporting the use of EDI using the X12 Standards in the following business areas. The individual implementation guidelines contain a more detailed explanation of the application.

Permit Compliance System (PCS) is an integral part of EPA's National Pollutant Discharge Elimination System (NPDES). PCS is one of EPA's largest computerized information systems, with approximately 12 million individual records in its data base. PCS serves six major purposes in support of EPA Headquarters, EPA Regions, and States in planning and implementing the NPDES program. This program uses the X12 Transaction Set 863 Report of Test Results to communicate Discharge Monitoring Report information as the reporting vehicle. Please refer to the DMR EDI Implementation Guidelines.

Hazardous Waste Manifest (HWM) system, as mandated by the Resource Conservation and Recovery Act (RCRA), was designed to track hazardous waste shipments from the point of generation to the point of disposal. The manifest provides information that is crucial to Federal and State implementation of RCRA. States use HWM data to prepare or verify EPA reports like the Biennial Report and to meet Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) capacity assurance requirements. States use the data for specific purposes such as enforcing regulations,

generating hazardous waste fees, identifying potentially responsible parties for Superfund site cleanups, meeting state reporting and management requirements, answering public inquiries and sharing information with other states. EPA headquarters and regions also depend on the data for verifying the hazardous waste handler universe. The U.S. EPA National Environmental Investigation Center (NEIC) uses HWM data to track the export of hazardous waste. This program uses the X12 Transaction Set 856 Ship Notice/Manifest as the reporting vehicle. Please refer to the HWM EDI Implementation Guideline.

Trans-border Hazardous Waste Manifest (TRANSHAZ) program is a variant of the Hazardous Waste Manifest program described above. It is designed for tracking hazardous waste shipments from "Maquiladora" facilities in Mexico to the United States for treatment, storage or disposal. It involves interaction among the U.S. Customs, the Government of Mexico, the state of Texas, the U.S. EPA and the subsidiaries of U.S. companies located along the U.S. -Mexico border, referred to as "Maquiladora". The system will use the X12 Transaction Sets 856 Ship Notice/Manifest and the 824 Application Advice as the reporting vehicle. Additional transaction sets will be used as needed. Please refer to the TRANSHAZ EDI Implementation Guideline.

Air Emission Statement (AES) is a report of discharges into the air from stationary sources. Recent amendments to the Federal Clean Air Act mandate extensive reporting of discharges into the air from stationary sources such as power plants, refineries, and industrial plants. These sources of air emissions must provide data to State air quality agencies that monitor compliance with air quality targets. The X12 Transaction Set 841 Specifications/Technical Information is to be the reporting vehicle. Please refer to the AES EDI Implementation Guidelines.

Reformulated Gasoline Program and Anti-Dumping Program (RFG) results from the Clean Air Act Amendments of 1990 that required the phase-in of reformulated gasolines for use in the nine worst ozone non-attainment areas by 1995. Other ozone nonattainment areas may be included in the program at the request of the state's governor. The regulations governing the program are located at CFR Part 80, Subparts D, E, and F, and identify the information required to be reported by refiners, gasoline importers, oxygenate blenders and independent laboratories. This program uses the X12 Transaction Sets 863 Report of Test Results and the 867 Product Transfer and Resale as the reporting vehicles. Please refer to the RFG EDI Implementation Guideline.

Biennial Reporting System (BRS) mandated by the Resource Conservation, and Recovery Act (RCRA) statute requires states to report to the EPA, every two years the volumes and composition of hazardous waste treated, stored, or disposed within their borders, chiefly to determine compliance with Capacity Assurance Plans (CAP). The CAPS are developed by the states and approved by the EPA to ensure that States have sufficient capacity available to manage expected volumes of hazardous waste that must

be stored, treated, or disposed within each state. This program uses the X12 Transaction Sets 863 Report of Test Results and the 841 Specifications/Technical Information as the reporting vehicles. Please refer to the BRS EDI Implementation Guideline.

Integrated Contract Management System (ICMS) is designed to automate, integrate, and track all aspects of procurement and contract management functions. ICMS is a major component of the Integrated Administrative System (IAS) under the Administrative Systems Division (ASD). ICMS and related contract management systems are fully automated procurement and contract management systems integrated with a financial management system.

The procurement business uses the X12 Transaction Sets 810 Invoice, 820 Payment Order/Remittance Advice, 824 Application Advice, 850 Purchase Order, 855 Purchase Order Acknowledgment, 860 Purchase Order Change Request - Buyer Initiated, 864 Text Message, and the 865 Purchase Order Change Acknowledgment/Request - Seller Initiated. Please refer to the ICMS EDI Implementation Guideline.

1.2.2 EPA EDI Objectives

An objective of EPA's EDI Program is to use EDI to provide economies in exchanging information with external partners. The U.S. EPA has developed an approach to EDI that will benefit all participants or Trading Partners - the regulated community, the State environmental program offices, and service and product suppliers. This approach includes:

- C Implementing EDI using ANSI ASC X12 standards;
- C Using existing transaction sets and developing EPA-specific convention documents;
- C Developing national standards for the implementation of environmental reporting;
- C Avoiding the development and proliferation of proprietary software, standards, procedures and conventions; and
- C Seeking voluntary collaboration with the regulated community, contractors and vendors.

Electronic Reporting

The U.S. Government Policy on EDI, as published in the Federal Information Processing Standard (FIPS PUB 161) became effective on September 30, 1991. Its objectives are to:

- C Have Federal Agencies achieve the benefits of EDI, (e.g., reduced paperwork, fewer transcription errors, faster response time for procurement and customer needs, reduced inventory requirements, more timely payment of vendors);
- C Ease the electronic exchange of data by the use of standards for data formats and transmission envelopes; and
- C Minimize the cost of EDI implementation by preventing duplication of effort.

The transmission of reports using EDI is consistent with the Agency's electronic reporting (ER) policy. Notice of EPA policy was published in the Federal Register, Notice No. FRL-3815-4, Volume 55, Number 146, July 30, 1990 and was entitled "EPA's Policy on Electronic Reporting." This policy establishes a uniform EPA approach to electronic reporting. In addition, this policy is intended to promote the adoption of electronic reporting by EPA Program Offices and to ensure that as they implement this technology, they do so in a manner that is both consistent across the Agency and compatible with the current electronic reporting practices in industry.

EDI and ASC X12 Standards

The American National Standards Institute (ANSI) was founded in 1918 as the national coordinator of the voluntary standards system for the United States. The system meets national standards needs by marshalling the competence and cooperation of commerce and industry, standards developing organizations, and public and consumer interests. ANSI coordinates the voluntary development of national consensus standards, approves standards as American National Standards, and serves as a clearinghouse and information center for American National Standards and international standards.

In 1979 ANSI chartered a new committee, known as Accredited Standards Committee (ASC) X12, Electronic Data Interchange, to develop uniform standards for electronic interchange of business transactions. This charter permits the adoption of national standards for EDI and enables all organizations to use a single agency (ASC X12) to develop and maintain transaction set standards.

ASC X12 develops Draft Standards for Trial Use (DSTU's) and publishes the entire set as a Release annually. The purpose of the Release is to put current approved draft standards into the hands of users on a more frequent schedule, to speed implementation, reflect user needs in the standards more quickly and allow the user to gain experience with the draft standards before solidifying them as American National Standards. Draft Standards for Trial Use undergo the ANSI-required public review process approximately every three to five years. ANSI-approved, published standards, including ASC X12 Draft Standards for Trial Use (DSTU's), as of May 1994 number 198 with an additional 102 draft standards that are under review. In developing the ASC X12 series of American national standards,

the ASC X12 subcommittees seek to minimize the need for users to reprogram their internal data processing systems to achieve an interchange. Consequently, the standards are structured so that computer programs can translate data from internal to external formats and vice-versa. In this way, either through internally or externally developed translation software and public-communications vendors, all sizes of firms and institutions using intelligent computational devices may benefit from the use of the standard. Through the use of this standard, all institutions can enjoy the efficiencies of a common interchange language rather than experience the difficulties of a proliferation of methods and procedures, which could occur if each institution were to impose its own formats on every other institution with which it does business.

1.3 Responsible Entity

EDI is a partnership that involves several individuals or functional groups within each organization. EDI is also a new way for the government to conduct business. For EDI to be successful, all who are involved must work together in an open and informed environment.

The **Trading Partner** (e.g., a governmental agency, a waste generator, a TSD facility, a municipality, a corporate entity, etc) is responsible for successfully communicating data to the EPA. Communicating data includes acquiring the data, presenting it to a translator for conversion to the X12 Standard and transmitting it via a prescribed route. Each Trading Partner is also responsible for acquiring required software and hardware and for problem resolution with the EPA. The EPA is responsible for providing the necessary Implementation Guidelines and testing assistance during the initial implementation to ensure successful delivery of the data.

An EDI project requires the services of individuals schooled in both EDI and the applications that handle the data. For the purposes of identifying various functions involved this publication has assigned the following titles and identified functions with those titles: Program Officer, EDI Coordinator, EDI Application Programmer and Telecommunication Coordinator. A successful EDI implementation is dependent upon having the responsibility of the functions assigned, not the titles.

Program Officer is responsible for the business area interface and for ensuring that each project participant is in compliance with the program regulations.

EDI Coordinator is responsible for the application program that uses the EDI data and for all problems at the application level including EDI documentation (e.g., wrong field, wrong data in field, missing fields, etc.). The Coordinator works closely with the EDI Application Programmer and may assume some of the Program Officer duties.

EDI Application Programmer is responsible for developing the interface program that bridges Trading Partner applications to the EPA EDI system. The Application Programmer is also responsible for all modifications and enhancements to the EDI

system. This includes problem resolution from the Trading Partner translator software to the EPA's mailbox and from the mailbox to the EPA's EDI Program Office system.

Telecommunications Coordinator is responsible for ensuring that the services provided under the Value Added Network (VAN) are compatible with the EPA's EDI requirements.

1.4 Introduction to EDI

EDI is the transmission in ANSI ASC X12 syntax, of unambiguous information of business or strategic significance between computers of independent organizations. The definition can be expanded further to include the electronic transmission of business documents from the application program of one computer to the application program of another computer within the framework of a standard format. The key elements in the definition are computer-to-computer and standard format. EDI reduces costs and errors associated with a paper document environment. EDI replaces the mail delivery and reentry of documents with the electronic mailbox and the delivery of business data directly to your computer application program.

1.5 How to Use the Implementation Guideline

These guidelines follow the ASC X12 recommended format specified in the "ASC X12 Guideline for Electronic Data Interchange EDI Implementation Reference Guidelines", approved February 1991, ASC X12 D/90-856. Chapters 1-10 contain information necessary for the EPA and its Trading Partners to fulfill the requirements for implementing the exchange of information utilizing EDI. These sections include the EDI business background and history, EPA policy and logistic issues, and a checklist on how to get started with EDI for Trading Partners and EPA Program Offices. Appendices, found only in the individual EPA implementation guidelines, contain the usage conventions of the specific X12 transaction sets to satisfy the information requirements of the EPA.

1.6 References

Questions, comments, and suggestions regarding this EPA EDI Implementation Guideline may be referred to:

Chief of Information Policy Branch
Office of Policy, Planning and Evaluation
U. S. Environmental Protection Agency
401 M Street S. W.
Washington, DC 20460
(202) 260-2706

Standards publications, guidelines and technical reports disseminate the technical and logical concepts reflected in the X12 Standards. DISA (*Data Interchange Standards Association*) publishes a catalog of the available standards. *Part I* is a document titled

"An Introduction to Electronic Data Interchange". *Part II* is the catalog of the ASC X12 Publications.

General or Technical questions about Electronic Data Interchange, ASC X12, ASC X12 Standards and Updates, international standards, or DISA can be directed to:

Data Interchange Standards Association, Inc (DISA)

Technical Department
1800 Diagonal Road, Suite 200
Alexandria VA 22314-2852
Fax: (703) 548-5738

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 2 - BUSINESS ISSUES

2.1 Implementation Considerations

When implementing EDI a multitude of questions must be asked and answered. How can we obtain management support? How do we justify cost? Who will be impacted by the use of EDI? These questions and a host of other questions regarding the impact of EDI on business issues will be answered in this section.

2.1.1 Establishing an EDI Committee

An EDI coordinating committee should be established. It is imperative that the EDI committee have a well defined and understood mission statement for itself and the designated project teams. This committee will be the focal point and control element for direction and communication. It should include representatives from all of the involved functions such as information systems, materials management, purchasing, sales, legal, audit, etc. The EDI committee will designate Project Teams to manage segments of the total project.

2.1.2 Implementation Suggestions

The following are implementation recommendations:

- C Talk with experienced EDI users;
- C Get involved with industry associations and standards organizations;
- C Determine EDI objectives;
- C Gain commitment from management, business units and support groups;
- C Establish an EDI Implementation Team;
- C Consider the extent to which internal systems are suitable for EDI;
- C Select pilot partners with experience in EDI;
- C Limit the initial effort to a few partners and transactions;
- C Identify appropriate products with which to start;
- C Begin with partnerships where transaction volumes are high;
- C Integrate EDI with existing systems;

- C Review tax, audit, and legal requirements;
- C Evaluate hardware/software alternatives and make selections, carefully weighing the use of PC software for data entry and high transaction volumes;
- C Provide an EDI training program (including training on EDI standards) for users;
- C Enlist the assistance of experienced consultants and third parties;
- C Establish agreements with trading partners;
- C If applicable, be sure links exist to allow transmissions to flow between third parties;
- C Have frequent progress discussions with partners and assign coordinator/contact;
- C Define methods to handle exceptions and problems;
- C Exchange documents in parallel mode for at least several cycles before initiation of live EDI data;
- C Discontinue paper documents when EDI is operational;
- C Publicize EDI benefits internally;
- C Expand EDI efforts by establishing trading relationships with partners of varying sizes, EDI experience, and computer sophistication;
- C Pursue EDI with only those partners where it makes business sense to do so;
- C Participate in EDI industry and standards activities;
- C Plan for significant up-front costs;
- C Resist trading partners who want to use proprietary formats; and
- C Get help from marketing, purchasing and other functional groups in the development of your EDI plans and architecture.

2.1.3 EDI Cost Justification

Short- and long-term benefits should be forecast when justifying the cost involved in implementing an EDI program. Trading partners face three cost categories:

- C Application development costs,
- C Supporting encryption when required, and
- C Modifying applications to capture the reporting data required.
- C Message costs.

The application development costs impact all trading partners. Trading partners existing applications will probably require some modifications. Trading partners that have no existing application will incur the development costs. There are three major cost areas:

- C Modifying EDI software to access the application systems,
- C Supporting encryption when required, and
- C Modifying applications to capture the reporting data required.

Translation software costs vary depending on the hardware and translation software selected for use. Consult with EDI translation software providers to determine the costs.

Message costs are a function of the transactions implemented, number of transactions, volume, frequency of transmission, time of day transmitting, method of transmission (direct, VAN, dial-up, etc.), VAN costs, and other factors.

2.1.4 Strategy for Implementation

Information needs to be collected to develop a successful strategy for implementing an EDI project. Consider the following when planning your implementation strategy:

- C Develop a business applications/trading partners matrix;
- C Designate EDI business contacts;
- C Obtain contact information for Value Added Networks (VAN);
- C Obtain contact information for software providers;
- C Determine what partner identification scheme should be used, (e.g., DUNS number);

- C Define terms of exchange and establish an agreement between trading partners; and
- C Develop an overall system data flow design.

Based on the information collected from business partners, develop an overall EDI plan. Conduct meetings/conferences with trading partners to define EDI plans and dates. Consideration should be given to those trading partners capable of doing EDI and having the desire to participate.

2.1.5 Transaction Sets

Determine the applicable ASC X12 transaction sets that will be used and the minimum data that will be necessary to satisfy the application data requirements. Determine which acknowledgements shall be used.

EPA implementations currently use, or have plans for using, the following ASC X12 Transaction Sets:

- 810 Invoice
- 820 Payment Order/Remittance Advice
- 824 Application Advice
- 841 Specifications/Technical Information
- 850 Purchase Order
- 855 Purchase Order Acknowledgment
- 856 Ship Notice/Manifest
- 860 Purchase Order Change Request - Buyer Initiated
- 863 Report of Test Results
- 864 Text Message
- 865 Purchase Order Change Acknowledgment/Request - Seller Initiated
- 867 Product Transfer and Resale
- 997 Functional Acknowledgment

The individual project Implementation Guidelines provide the details of the use for each transaction set.

2.1.6 Pilot Program

A pilot program is a method of initiating EDI that provides the ability to test concepts, practices, and EDI policies. A pilot program is the initial step of a production implementation schedule. The schedule should encompass the inclusion of all applicable trading partners into the EDI system. An integral part of a pilot program is to establish test criteria. These criteria must include:

- C Coding and testing the interface to in-house system(s);

- C Conducting system tests with translation software and network (if used);
- C Conducting system tests with the trading partners using a test data file and/or testing with live data;
- C Sending sample X12 data to trading partner;
- C Initiating parallel processing.

2.1.7 Education

Educating internal and external personnel in EDI is vital to the success of any EDI project. User personnel should be educated as to why the company is implementing the standards and what impact it may have on the current procedures. Trading partner education regarding EDI transactions and future plans can be accomplished on an individual basis or through sponsoring trading partner conferences.

2.2 Timing of Transactions

A number of timing issues to be considered and resolved with trading partners when determining the timing of transactions include:

- C When the business transaction(s) will be made available to the trading partner,
- C Rules for acceptance/rejection of transmissions including time stamp of the transmission;
- C Retention periods for both sender and network message storage transmission;
- C Timings of the transaction acknowledgment;
- C Methods of handling legal holidays;
- C Deadlines for submission of the information and receipt of functional acknowledgments; and
- C Abilities of the existing computer systems to respond within a specific time frame.

2.3 Modes of Operation

The two modes of operation are Production and Test. Production is used when both partners agree both systems are communicating the agreed upon data for the transaction sets implemented. The test mode is used when implementing a new transaction, when making a modification to implemented transactions, or when upgrading to a new version/release. The Trading Partners should be aware of when the test mode will be used in order to provide assistance to each other. Identification of the mode of operation is contained in the ISA (Interchange Control Header) Position ISA15, Data Element I14. A "P" identifies production data and "T" identifies test data.

Trading Partner systems must have the provision to handle both production and test transaction sets.

2.4 Security

The risks inherent in the EDI process are based on the lack of paper documentation to backup the transactions. EDI involves the transmission of electronic messages, or records, that may never be converted to hard copy. Therefore, the electronic records must be able to stand alone as submission data. These records are subject to the same security requirements as are all types of EPA data.

The EDI process must include all steps necessary to ensure that the records are authentic, are properly authorized, and are retained in a manner that will ensure the integrity of the records. Audit trails must be maintained for accountability.

The *integrity* of EDI messages is essential. Security controls must be in place to ensure that the message is not modified and that electronic records are protected from loss or destruction. In addition, if EDI messages contain sensitive or Confidential Business Information (CBI), adequate controls must be in place to protect the data from inappropriate disclosure.

The *authentication of the originator* is a critical security issue for EDI. The process must be able to ensure that the source of the message is the named originator.

Computer security plans must be developed for EDI. The resources allocated to protecting EDI systems must be based on the risk and magnitude of potential harm that could result from the loss, misuse, or inappropriate access to or modification of EDI data. Specific controls should be implemented for the following aspects of the EDI system:

Integrity - Controls, such as audit trails, access control mechanisms, and separation of duties must be in place to protect the integrity of EDI data. Controls within the EDI environment for protecting data integrity include the following techniques:

- C Recalculating and verifying real totals and hash totals for critical parameters

- C Repeating messages or parts of messages rather than using only a functional acknowledgement.
- C Including unique identifier codes within each message to define each message as a separate distinct message.

Confidentiality - EDI systems processing confidential data, such as Privacy Act, CBI, or enforcement data must include access controls to restrict access to authorized personnel only. Access controls include technical controls, such as passwords or encryption, as well as procedural controls, such as restricted access to physical areas processing confidential data.

Availability - Contingency plans must be prepared to provide for continuity of operations in case of system failure or system degradation. Contingency plans should include backups on a periodic basis commensurate with the importance of the data maintained within the system. The contingency plan must also be tested periodically to ensure that it accounts for all possible threats to system and data availability.

Authentication - Authentication controls must be in place to ensure that the source of the message is the named originator. Non-repudiation should be used when authentication is a critical issue. Specific techniques for authentication include:

- C Returning an acknowledgement for each message sent. A valid message will send an acknowledgement to the originator within a pre-specified time period
- C Utilizing specific log-on techniques.
- C Including secret (known only to the parties involved) reference numbers or passwords within the body of the message.

Written agreements - Written agreements can be used to stipulate the specific security and authentication mechanisms to be used.

In addition, cryptographic techniques should be considered, especially for high-risk systems, to protect the confidentiality, integrity, and authentication of EDI systems.

Procedural controls can be implemented to protect the integrity, availability and confidentiality of EPA's information and systems. Procedural controls may be less expensive and easier to implement than technical controls. Procedural controls can include activities such as limiting physical access to data entry or computer areas, providing security training, creating security procedure manuals, and requiring separation of duties.

The laws and regulations mandating safeguards mandating safeguards for Federal information and information systems include:

- C The Privacy Act of 1974 (P.L. 93-579);
- C The Freedom of Information Act (5 U.S.C. 552);
- C The Paperwork Reduction Act of 1980 (P.L. 96-511);
- C The Computer Security Act of 1987 (P.L. 100-235); and
- C U.S. Code, Title 18, Section 1905

The organization that initiates an EDI system should take care to avoid making unreasonable demands of its trading partners. While the initiating trading partner may have the Resources and expertise to handle an EDI system easily, this may not always be true of the other partner(s). These limitations of resources and expertise should be taken into account. Please refer to the individual project EDI Implementation Guideline for specific security requirements.

2.5 Backup and Recovery Procedures

Backup and recovery procedures are necessary to provide:

- C Retransmission capabilities;
- C Translator re-run capabilities;
- C Minimum 24- to 48-hour immediate access backup; and
- C Archive and recovery capabilities for individual EDI transactions.

The backup and recovery procedures must be thoroughly documented to allow anyone with the proper authority to access the system to retransmit data.

It will be up to each EDI partner to keep their own records and archives of EDI transactions sent and received. Either partner must have the capability to retransmit an EDI message.

The Functional Acknowledgement (997) transaction set can be used to provide a level of automation in the backup and recovery area. If the EDI system expects to receive a Functional Acknowledgment for every transaction it sends, the EDI message should be available for retransmissions until a Functional Acknowledgement corresponding to a specific EDI message is received. Once the Functional Acknowledgment is received, the original EDI message can be archived regardless of the normal archive timing.

The Agency requires the use of the Functional Acknowledgment. The Functional Acknowledgment is used to confirm receipt of the Trading Partner's transmission and indicate acceptance or rejection of the transaction set by the translator. A Functional Acknowledgment is not required for a transmission of Functional Acknowledgments.

2.5.1 Disaster Recovery Considerations

Disaster recovery becomes correspondingly critical to the amount of business that is conducted through the EDI channels. Consider the consequences to you and your trading partners if you were suddenly unable to exchange transmissions for an extended period. It is unwise to assume that you can fall back on a paper-based system. Your trading partners may not be able to quickly switch from EDI messages to mailing their business transactions to you. You may not have immediate access to the resources within your organization needed to process paper transactions.

Develop a plan to deal with extreme problems, such as a total loss of a Data Center or computer system and a loss of a phone company switch station servicing your area.

2.6 Audit Considerations

One of the first questions raised when considering the use of EDI relates to its impact on controls. Without a signed document and a paper audit trail, how will one know when a transaction is valid and approved?

The same elements of control will exist in an EDI-based system that exist with a paper-based system. Most controls related to EDI fall into three categories: confidentiality, integrity, and authenticity. Confidentiality is the control that allows only authorized persons access to the transactions. Integrity controls validation of the data. Authenticity is the control that ensures the receiver that the transaction received is valid and belongs to them.

The following are specific examples of controls within the confidentiality, integrity, and authenticity control categories.

Confidentiality

- C Encryption is a method of logically scrambling the EDI information with an encryption key and giving the key only to persons who have a right to that information. The key is an electronic code for this procedure.
- C Password protection is a method used to control access to files. Passwords should be changed often for maximum effect.

- C The use of a stand-alone computer for receiving EDI transmissions controls access to the main computer. Once the EDI data is on the stand-alone computer, it can be validated and uploaded to the main computer for use in applications.

Integrity

- C Communications protocols provide bit count checking.
- C Every X12 transmission contains Segment, Transaction Set, and Functional Group counts. Hash Total and selective segment counts are provided by certain transactions. Functional Acknowledgments are available to confirm transaction receipt and compliance to the standard.
- C Translators provide code validation and syntax checking.

Authenticity

- C Value Added Networks (VANS) validate:
 - Sender/receiver identifications
 - Passwords
- C Translator Trading Partner Profiles validate:
 - Sender identification
 - Password
 - Version/Release
 - Transmission sequence
 - Transaction Set
- C Application programs validate:
 - Personal Identification Numbers (PIN)
 - Specified data contained in the Transaction Set (i.e., dates, reference numbers).

SECTION 3 - LEGAL CONSIDERATIONS

3.1 General Introduction

The Agency's EDI projects were established to support facilities that voluntarily wish to support submissions of data electronically. Certain projects will continue to require continuation of the current paper forms. Regulations as currently written require the forms and signatures. Refer to the individual Project EDI Implementation Guidelines for the specifics of that project.

Businesses require control over their contractual correspondence. Such control includes the determination of when correspondence is transmitted, to whom it is transmitted, when it reaches the recipient, and an appraisal of the accuracy, integrity and risks of the communication. Some of the legal issues include:

- C Various offer and acceptance rules,
- C The propriety of EDI in lieu of hard copy documents,
- C The competency of sufficiency and evidence,
- C Electronic mailbox controls,
- C Legal and regulatory record retention issues,
- C Ownership and liabilities, and
- C Various risks of transmissions.

Most commercial law has been developed without specifically addressing electronic message systems. The precise legal status of EDI transmissions is therefore unclear in many cases.

EDI has been used successfully for a considerable number of years. For many companies, legal uncertainties have not posed a substantial obstacle to the adoption of EDI. In many instances, the legal risks of using EDI — when compared to the risks associated with traditional paper-based trading systems — have been considered to be manageable. Certain legal risks have been addressed with special agreements between trading partners and the adoption of appropriate in-house policies.

It is important that new users consult with counsel throughout the EDI implementation process. This chapter provides a very brief introduction to some of the issues counsel should consider when a new user implements EDI. The full range of issues that must be dealt with, and the importance of any particular issue, will vary from one user to the next.

EDI implementation should initiate a process by the business entity of rethinking its entire records management and retention policies. The ultimate decision regarding scope and retention period of electronic records depends on the company's overall business strategy and requirements.

3.2 Record Keeping

The EDI transmission facilitates the submission of data by trading partners. The hard copy retention of forms is an individual program consideration that may be specified in regulations.

Internal control systems should be reevaluated in the context of EDI to assure responsibility for data maintenance, including audit trail, transaction reconciliation, and backup capability.

When business transactions are recorded on paper documents, businesses can store those documents as evidence of what took place. The intent of EDI is to eliminate the transmission of paper documents. Internal record keeping systems should therefore be reevaluated in the context of EDI. The ideal EDI record retention system meets the following record keeping criteria:

- C Copies of all EDI transmissions must be retained.
- C EDI transactions must be retained in both the original and translated format in addition to normal application file retention.
- C Storage medium for EDI transactions must be determined.
- C Transmission activity logs containing pertinent time information must be retained.
- C All programs used in the EDI system must be retained for the life of the record retention.
- C Records must be able to be retrieved in a form that can be admissible in any judicial or other proceedings.
- C Record retention periods must be established.

3.3 Authentication

Authentication refers to the establishment or verification of a claimed identity. This may be the sender or receiver associated with a message. Authentication of an EDI transaction is contained in the transaction. All EDI transactions have the ability to identify all parties involved.

Another device commonly used for authentication is the Personal Identification Number or PIN. When an Agency Project Office implementation requires a PIN, it is placed in the transaction with the identity of the individual and the individuals organization.

It is important that the source and the integrity of data transferred between the trading partners be assured before the data is manipulated. The security and controls needed to provide a proper level of assurance is a business decision that should be based on an assessment of the risks involved. The decision to implement a Message Authentication Code (MAC) should be mutual between trading partners and stated as a requirement in the trading partner agreement.

Traditionally, paper documents and signatures have been used to authenticate the data that constitute commercial transactions. Authentication of EDI transmissions requires different methods of authentication. With the implementation of any particular EDI system, users and their counsel should ask the following questions within the context of the user's particular needs:

- C Will the integrity and completeness of data transferred between trading partners be adequately assured before it is relied upon?
- C Will the source of a message, and the legal authority of that source, be satisfactorily verified before the message is relied upon?
- C If determined necessary, will adequate records be kept to show that authenticity of messages was tested?

EDI poses no different threat from any automated system that utilizes telecommunications. The issue is automation and electronic data vs a paper-based system. EDI formats simply provide a structure to that data.

3.4 Trading Partner Agreement

Trading partner agreements (TPA) are an important part of EDI systems. They serve as the "interface specification" between trading partners and provide specific details of the legal agreements that define how the electronic commerce is to be conducted. Qualified legal advice is required when a TPA is drafted. However, the TPA must be more than a legal agreement between two organizations that exchange data.

Because the use of an electronic medium affects the trade relationship, TPA's are generally recognized as fundamental to the EDI trade relationship. TPA's can:

- C Bolster the enforceability of electronic transactions,
- C Reduce confusion and potential misunderstanding,
- C Apportion liability between the trading partners,

- C Define confidentiality and security obligations,
- C Serve as an educational tool and implementation checklist, and
- C Provide an important audit and control mechanism.

The scope and treatment of issues addressed by a TPA generally depend on:

- C The nature of the anticipated transactions,
- C The policies and perspectives of the trading partners,
- C An assessment of the risk, and ultimately,
- C The issues upon which the trading partners reach agreement.

The TPA should have the following characteristics:

- C Administrative efficiency,
- C Simplified legal approval,
- C Definiteness, and
- C Certainty to expedite trade.

3.5 Third-Party Agreements

If a user employs a VAN, the company that supplies the VAN services will probably require that the user enter into a data communications agreement with it. Among the issues the user should consider addressing in such agreement are the following:

- C A description of the services to be provided.
- C The warranty by the VAN of its services.
- C The liability of the VAN for a breach of the agreement or any damages resulting from the mistakes of the VAN or its employees.
- C The security, confidentiality, and integrity of messages handled by the VAN.
- C The responsibility of the VAN in the event of a system failure or disaster.
- C The disposal of data stored by the VAN in the event of a disagreement or an interruption or termination of services.

- C A description of the applicable pricing structure.
- C The termination of the agreement.
- C An assumption of an independent, third-party review of the third-party vendor.

3.6 Laws, Rules, and Regulations

There is no adequate or comprehensive source of EDI law, but there are a few sources of laws, rules and regulations that users may wish to consult. They are available through the American Bar Association (ABA). Other sources may be applicable for transactions within specific markets, industries or jurisdictions.

When implementing EDI, users and their counsel should consider whether any special laws, rules or regulations apply to the users. Utilities and government contractors should carefully consider whether regulations applicable to them restrict the implementation of EDI. It is not uncommon, for example, for government regulations to require documents to be written on paper or have ink signatures.

Users should also be aware that the International Chamber of Commerce has adopted Uniform Rules of Conduct For Interchange of Trade Data by Teletransmission (UNCID). UNCID purports to set forth voluntary rules of communication by EDI users. A copy of the UNCID rules may be obtained from the ICC Publishing Corporation, 156 5th Ave., New York, New York 10010. It should be noted that ANSI X12 neither endorses nor opposes UNCID.

THIS PAGE LEFT INTENTIONALLY BLANK.

SECTION 4 - ENVIRONMENTS

4.1 System Architecture

The graphic description of how the software and hardware are assembled to support the needs of the user is called the system architecture. The system architecture relates primarily to the needs of the end user rather than technique or technology. The system designer, as with any other architect, must satisfy the user's requirement within the constraints of serviceability and cost.

There are three basic EDI system architectures:

Stand-alone Microcomputer: Outbound transactions are keyed into the microcomputer. Inbound transactions are transferred to an attached printer. Translation software (to/from ANSI standard) resides within the microcomputer. Communication software/hardware handles both inbound and outbound transactions.

Microcomputer/Minicomputer Front-End: The microcomputer serves as a front-end processor to the mainframe. The translation software (to/from ANSI standard) resides within the microcomputer.

Mainframe/Minicomputer: All processing is performed within the mainframe. Inbound transactions are received by the mainframe, translated, and forwarded for further processing. Outbound transactions are consolidated, translated, and transmitted. Network communications hardware/software are under the control of the mainframe.

With the addition of value-added network services, you can "mix and match" the basic architectures and let the network manage the complexity of different hardware/software. The networks provide the capability of indirect communications through the use of electronic mailboxes and support code, speed, and protocol conversion. Specifics may be found in the applicable project EDI guideline.

4.2 Application Integration

Application refers to the current functional processes which may or may not be automated. To take full advantage of EDI, it should become part of the functional processes and not an add-on. EDI will change the way you conduct your business. Planning for integration will reduce the impact of this change and allow a smooth transition to an environment which maximizes your return on investment. Total integration does not have to be achieved before starting EDI, but it should be an established goal. Failure to achieve integration will result in the attainment of some short-term benefits, but the real benefits which come from increased automation will be unattainable. Please refer to the individual project Implementation Guidelines for the details of a specific Program Office implementation.

4.3 Translation

Translation is the automated process of converting application data in a proprietary format to X12 Standard formats for sending transactions. The process is reversed when transactions are received in the X12 formats. The core translation program uses "table driven" subroutines to generalize processing regardless of the actual application being processed. Specifications are taken by the program, depending on the data being processed and the particular tables associated with the transaction set. The ASC X12 standard provides a specific structure for the data. It does not affect the program design or the program function. As a consequence, there are many commercial software packages which provide "core translation" and other related functions that are designed to support different EDI environments.

Some of the factors to be considered when deciding whether to make or to buy translation software are the efforts required for programming, maintenance, testing, incorporating upgrades to the X12 Standard, and the development of the administrative programs necessary to satisfy EDI audits. The availability of relatively inexpensive proven commercial software packages supported by a growing industry should make development unnecessary. EDI software should be managed as "system software" rather than "application software".

SECTION 5 - MAINTENANCE

5.1 Maintaining Guidelines

Maintenance of this guideline is the responsibility of the United States Environmental Protection Agency, Information Policy Branch, Office of Policy, Planning, and Evaluation. Questions are to be referred to:

Mr. David Schwarz
Information Policy Branch
Office of Policy, Planning, and Evaluation
U. S. Environmental Protection Agency
401 M Street S. W.
Washington, DC 20460
(202) 260-2706

5.2 Maintaining X12 Standards

ASC X12 has a standard procedure for developing new transaction sets and maintaining existing sets. Refer questions to the EPA EDI Coordinator of the Program Office responsible for the project. Should additional information be required, the question will be referred to:

Data Interchange Standards Association, Inc (DISA)
Technical Department
1800 Diagonal Road, Suite 200
Alexandria VA 22314-2852
Phone: (703) 548-7005
Fax: (703) 548-5738

5.3 Version/Release

X12 publishes a new Version/Release annually. The publication contains the new transaction sets and the maintenance approved by the X12 Committee. New Version/Releases are neither upward nor downward compatible. The new publication may not affect current implementations. However, if it contains functionality necessary to the particular implemented project, the EPA EDI Project Coordinator will initiate the necessary actions to notify the implementors, develop an implementation schedule, revise and distribute the implementation guidelines and coordinate an orderly transition to the new Version/Release.

The Version/Release for each transaction used by the individual projects will be in the applicable EDI Project Implementation Guideline.

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 6 - COMMUNICATIONS

6.1 General Introduction

This section provides an overview of the communication options available to Trading Partner(s) planning to implement EDI. Its purpose is to highlight the areas where key data communication decisions must be made. There is no single or preferred solution. Each Trading Partner must determine the proper approach based on current and projected transaction volumes and desired level of investment. Specific communications information for each EPA project is contained in the applicable EDI Project Implementation Guideline.

Communications is the transport of information in an EDI environment and may be by physical or telecommunication means. Physical means include the use of magnetic tape or courier service. Data communication means the use of a public or private telecommunications. Criteria to be considered when determining the communication mode of data transfer include the following:

- C Distance of transport
- C Number of destinations
- C Costs
- C Delivery time frame
- C Frequency of transport
- C Security
- C Volume of transactions
- C Compatibility of media
- C Reliability

Each exchange method should be analyzed to determine whether or not the approach meets the Trading Partners' communication needs. No matter which approach is selected, a contingency plan should be formulated to address the possible event of a communication failure.

Issues to consider are procedures to address system failures, transmission error recovery including establishing the maximum number of retransmission attempts, security, network response time, and error reporting.

6.1.1 EDI Communication Alternatives

Telecommunications moves data between two points by either a dedicated or a switched connection. Dedicated connections are direct permanent links. Switched or dial-up connections are temporary links for the duration of a communication session. The connections may be direct between trading partners or may employ the use of a third party. A third party is a service provider which may provide added services such as routing services, electronic mailboxes, storage, speed and code conversion, and translation. A third party that provides these services is referred to as a Value Added Network or VAN.

An organization's specific EDI transmission requirements will determine the appropriate telecommunications route. To determine the best alternative for your telecommunication needs, consider the following:

- C Number of Trading Partners
- C Volume of transactions
- C Delivery time frame
- C Frequency of transport
- C Compatibility of media
- C Reliability

6.2 Protocols

Protocols are a set of conventions between communicating devices. Simple protocols define only hardware configuration, more complex protocols define timings, data formats, error detection, and correction techniques.

6.2.1 EDI Data Transfer Protocol

Communication capability, security, and data integrity are communication protocol issues to be addressed by EDI trading partners.

Communication Compatibility

- C Electrical Signaling
 - Signaling between communication hardware, modem communication, and channel modem

- Modem types
- Transmission speed compatibility

C Line Control Protocol

- Between communications software, such as asynchronous, binary synchronous, and other protocols
- Call establishment
- Data blocking and organization
- Acknowledgement and signaling for handshaking and error control
- Line turnaround procedures
- Character synchronization
- Escape interrupt disconnect

C Data Transfer Protocol

- Compatible EDI data transfer programs and techniques for managing data transfer

Security

- C** EDI data going only to the intended trading partner
- C** Control over access to communications and business systems
- C** Identification and authorization of trading partners
- C** Authentication

Data Integrity

Data Transfer Process Integrity refers to the actions taken to prevent problems. An objective of the EDI communication system is to provide a high degree of data process integrity to:

- C** Minimize potential loss of data by providing intermediate safe storage, interchange authorization, retransmission approval, and mutual results commitment.

- C Minimize the potential for data duplication by providing temporary data suspension
- C Minimize the potential for situations that require human intervention by providing status retention and transfer restart capabilities.

Error detecting protocols should be considered as the minimum communication requirement for EDI. Asynchronous and binary synchronous communication protocols provide error handling techniques based on the specific implementation.

6.2.2 Transmission Protocols

Transmission or data link protocols are either character-oriented or bit-oriented.

- C ***Character-oriented protocols*** use a particular code set for transmission with some of the characters in the code set reserved for control functions. Asynchronous and binary synchronous protocols are examples of character-oriented protocols.
- C ***Asynchronous protocol*** is synchronized by sending and receiving Data Transmission Equipment (DTE) before each character is sent. Each character has a start and stop bit to indicate beginning and end of each character. The start and stop bits are the mechanism by which synchronization is established. Typical asynchronous communications accommodated by microcomputers are transmitted at a baud rate ranging between 300-9600 bits per second (BPS). Asynchronous accuracy is inversely proportional to the speed of the data transfer. Higher levels of accuracy can be obtained through the use of XMODEM, KERMIT, and others.
- C ***Binary synchronous*** or bi-sync bit synchronization is established for a much longer duration, usually for the time it takes to transmit several thousand bits. This results in less transmission overhead but requires more complex circuitry. Typical binary synchronous communication is transmitted at a baud rate ranging between 2400-9600 BPS. Binary synchronous accuracy is not dependent on the speed of the data transfer.
- C ***Bit-oriented protocols*** are independent of any particular code set and no character codes are reserved for control functions. High Level Data Link Control (HDLC) and Advanced Data Communication Control Procedures (ADCCP) are examples of this protocol. The major advantages are in speed and standardization.

6.3 Point-to-Point

Point-to-point or direct connect service is communication between two trading partners. Point-to-point may employ dedicated circuits, or dial circuits, or a combination, of the two. The type of circuit used depends on a number of factors, two of which are volume and speed or timing of the transmissions. An EDI user that elects direct communication with trading partners must have the necessary in-house staff capable of managing the network and must address a number of issues with each individual trading partner. Some of these issues are:

- Service Levels
- Communication Speeds
- Transmission Modes
- Modem Capabilities
- Line Protocols

Additionally, an EDI user electing to implement direct connections must be aware that not all trading partners will have similar capabilities and therefore the trading partner may by necessity elect to use a third party service.

6.4 Third-Party Services

Third-Party Services are those utilizing switched network technology and providing value added services. Switched networks connect and disconnect circuits as required to exchange data. The three common switched network methods are circuit switching, message switching, and packet switching.

Circuit Switching is used in public telephone systems. A circuit is dedicated between the source and destination for the duration of the transmission. The sender and receiver must be available at the same time.

Message Switching networks package the data in messages and pass the messages from switch to switch. The sender and receiver do not have to be available at the same time, since the message is stored at each intermediate step. For this reason, message switched networks are also referred to as store and forward networks.

Packet Switching is similar to message switching, but it divides the data into smaller, equal-sized pieces called packets. It takes less time to move data through the network, since large messages don't have to be stored at each intermediate switch. The reduced delay, over message switching, allows the two users to carry on a dialogue, referred to as an interactive process. In addition, the reduced delay aids transaction processing by moving the transactions to their designation quickly. The advantage of packet switching over circuit switching is that packet switching makes efficient use of the data lines. Each packet carries a destination address, so packets from multiple sources heading to different destinations can be transmitted down the same data line.

The above facilities and services may be obtained from commercial networks called Value Added Networks (VAN) rather than developed in-house. The commercial networks provide the network management and knowledgeable staff to support your communication requirements. Commercial networks now offer more than moving data from one site to another. Services provided include mailbox service, data storage, speed and format conversion, and translation.

Not all companies have the communication facilities to accommodate the multiple communication protocols that may be used by their potential trading partners. Third-party service providers eliminate the need for a Trading Partner to invest heavily in communication hardware, software, and personnel. A third-party service provider allows the convenience of a single data transfer link to multiple trading partners independent of operating schedules, protocol conversion, hardware interface, and conversion requirements.

When selecting a third-party service provider, a Trading Partner should evaluate the service capabilities and performance offered. Issues to consider include:

- C Speed of delivery
- C Dial out capabilities (e.g., auto-dial, scheduled)
- C Data integrity
- C Reliability
- C Job queuing options
- C Interconnect capabilities
- C Tracking and control reporting (audit, historical, and exception reporting)

Before data transfer begins with a third-party service, communications should be mutually defined and agreed upon. The use of third-party communications should be transparent to trading partners.

When establishing an EDI partnership, it is necessary to determine how the costs of third-party services will be apportioned. These costs are usually split equally between the trading partners. Costs associated with the use of a third-party service include:

- C Start-up charges
- C Mailbox fees
- C Connect charges
- C Data storage
- C Network interconnect
- C Character charges
- C Reports

6.5 Network Interconnects

Network interconnects are a viable means of exchanging data when each Trading Partner wishes to use their preferred VAN. It is the responsibility of each partner to research whether their preferred VAN has the full complement of desired interconnect capabilities with the other.

THIS PAGE LEFT INTENTIONALLY BLANK.

SECTION 7 - MISCELLANEOUS

7.1 Industry Business Models

7.1.1 Introduction

The EPA has implemented a number of ASC X12 Transaction Sets. Selection of a transaction set is based on the specific business issue to be solved and the defined purposed of the transaction set. It is the intention of the EPA to use national standards where they exist and to avoid developing specific purpose transaction sets. The following is an overview of the Transaction Sets used by EPA Program Offices in their implementations of EDI. Detailed descriptions of their uses are found in the individual Program Office EDI Implementation Guidelines.

7.1.2 Transaction Sets

EPA implementations currently use, or have plans for using, the following ASC X12 Transaction Sets:

810 Invoice Transaction Set

Used by the Office of Acquisition Management (OAM), to send invoice information replicating the information in the GAO 1034 form. The office also receives invoices from suppliers that provide input to CPS.

820 Payment/Remittance Advice Transaction Set

Used by the Office of Acquisition Management (OAM), to notify the trading partner of payment for services or goods that have been provided. At this time, the 820 Transaction Set is generated only by CPS.

824 Application Advice

Used in the Hazardous Waste Manifest system to notify the reporting party of errors or informational details found by processing the information in the Ship Notice/Manifest.

The 824 Application Advice Transaction Set will provide rejection or approval of invoice information. An 824 Transaction Set can be generated at a number of points during the invoice processing cycle. Currently, an equivalent paper form of the 824 Application Advice Transaction Set is not produced. Using the 824 Transaction Set improves and expedites the payment process.

841 Specification/Technical Information.

Used by the Bureau of Air Quality Control (BAQC) , Pennsylvania Department of Environmental Resources (PADER) to receive Air Emission Inventory collection requirements.

850 Purchase Order Transaction Set

The 850 Purchase Order Transaction Set is used by CDOTS to convey to vendors Delivery Order information that is currently entered on Optional Form 347.

855 Purchase Order Acknowledgment

The 855 Purchase Order Acknowledgement Transaction Set is used by vendors to convey to CDOTS the acceptance of an 850 Purchase Order Transaction Set.

856 Ship Notice/Manifest

Used to communicate hazardous waste information required by the EPA and Department of Transportation (DOT) to track the movement between generators, transporters and TSD facilities.

860 Purchase Order Change Request - Buyer Initiated

The 860 Purchase Order Change Transaction Set is used by CDOTS to convey to vendors changes to a specific 850 Purchase Order Transaction Set.

863 Report of Test Results

The Office of Mobile Sources (OMS), Field Office Support Division (FOSD) for the Reformulated Gasoline Program, receives information about the chemical composition of reformulated gasoline produced or imported into the country. Reporting is by individual batches and for annual submissions of summary information.

The Office of Water Enforcement and Permits (OWEP), the National Pollutant Discharge Elimination System (NPDES), receives pollutant discharge information from NPDES permit-holding facilities. The information is used by the Permit Compliance System (PCS) to track permit, compliance, and enforcement status.

864 Text Message

Used by CPS to supplement information delivered in the 810 invoice transaction set.

865 Purchase Order change Acknowledgment/Request - Seller Initiated

The 865 Purchase Order Change Acknowledgement Transaction Set is used by vendors to convey to CDOTS the acceptance of an 860 Purchase Order Change Transaction Set.

867 Product Transfer and Resale

The Office of Mobile Sources (OMS), Field Office Service Division (FOSD) for the Reformulated Gasoline Program, receives information about the transfer of oxygen and benzene credits between refiners. It is also used to report areas of the country into which certain products are sold.

997 Functional Acknowledgment.

The purpose of this transaction is to communicate to the transmitting party that their transmission was received and that the translator used by the receiving party was able to translate the transactions. It is used by all EPA EDI implementations.

The 997 does not guarantee the validity of the data submitted in a transmission it only acknowledges receipt of the transmission.

7.2 Related Industry Topics

Not currently used.

7.3 EDI Vendor References

EDI is offered as a standard interface so trading partners, software manufacturers and value-added-networks can interact without concern for proprietary features. Trading partners must acquire the services of an X12 Translator and communications software. These services may be purchased software to run on a the trading partners computing platform. The translator can be a purchased service provided by a value-added-network. It can also be developed in-house. Before developing an in-house translator, examine the development costs and the maintenance costs. A new version/release of the X12 Standard is released annually with sub-releases available for standards approved for publication in February or in June. When updated EDI standards are available, they may or may not need to be implemented. Implementation of an updated Version/Release is governed by the enhanced business support it provides, the need for that enhanced support by the trading partners, and the desirability on the part of the trading partners to maintain previous Versions/Releases.

For the purpose of the EPA EDI Projects, Trading Partners shall acquire the EDI software that best meets their needs for interfacing with the EPA Program Offices and with other Trading Partners they may have.

The EPA does not recommend or endorse any vendors translation or communication software. Listings of EDI software and service vendors can be obtained through ASC X12, EDI periodicals and trade journals. The Logistics Management Institute has published a guide entitled "A Guide to EDI Translator Software, 1994 Edition" that identifies and provides details on commercially available EDI software packages. The following provides some ideas for criteria to consider.

Translator software should have the following minimum capabilities:

- C The software should contain communications capabilities to sends or receives EDI-formatted data.
- C The software should provide an application system interface program that extracts data from an application data base and creates fixed-length files in the vendor's format for subsequent translation to an EDI format. The reverse is also required.
- C The software should provide a reporting facility to generate error reports of outbound or inbound transactions and inbound and outbound transaction set reporting.
- C The software should provide the ability to send or receive Functional Acknowledgement to identify the successful receipt of information by Trading Partners and the highlighting of unacknowledged transaction sets that have been sent.
- C The software should provide the facility to edit incoming and outbound data to determine whether they are in compliance with EDI standards.
- C The software should provide a facility that monitors the use of internal business document identification numbers, such as manifest numbers, to avoid duplication.
- C The software should maintain EDI data elements and segments in a table structure.
- C The software vendor should provide technical documentation, user documentation, maintenance support, help desks, tutorial packages and training support to assist the Trading Partners in the use of the translation software.
- C The software should provide the facility to maintain a profile of each Trading Partner that identifies the name, D&B number, organizational identifier, phone numbers, and segments in a transaction set required by the Trading Partner.

- C The software should have automated data-mapping procedures embedded in the EDI translation software that creates fixed-length files according to the user's requirements for subsequent translation to an EDI format. The reverse process should also be provided.

- C The EDI software package must support the current and two previous release of an EDI standard.

THIS PAGE LEFT INTENTIONALLY BLANK.

SECTION 8 - GLOSSARY OF TERMS

ANSI, American National Standards Institute.

ANSI Standard, A document published by ANSI that has been approved through the consensus process of public announcement and review. ANSI Standards are developed by committees accredited by ANSI (see ASC) and must be revisited by the developing committee within five years for updating.

API, American Petroleum Institute.

Application Acknowledgment, A transaction set that returns a response to a transaction set that has been received and processed in an application program. The Purchase Order Acknowledgment transaction set 855 is an example of an application acknowledgment, used to respond to the Purchase Order transaction set 850 presenting such things as whether the receiver can fulfill the order on time.

Application Advice (824), A transaction set returned to the original sender to report the results of an application system's data content edits of the sender's transaction set.

Area, Transaction Set, Identifies a defined area within a transaction set containing segments. The areas may be referred to as Table 1, Table 2, Table 3 or Header, Detail and Summary.

ASC X12, Accredited Standards Committee X12. Its purpose is to develop uniform standards for electronic interchange of business documents. Membership is open to virtually all organizations and individual with a material interest in the standards. standards.

AAR, Association of American Railroads.

ATA, American Trucking Associations, Inc.

Authentication, A mechanism that allows the receiver of an electronic transmission to verify the sender of the integrity of the content of the transmission through the use of an electronic "key" or algorithm, which is shared by the trading partners. This is sometimes referred to as an electronic signature.

BSR, Bureau of Standards Review.

CAP, Capacity Assurance Plan. A plan required by CERCLA, prepared by states using data from UDMR shipping documents and/or Biennial Reports.

CEC, Commission of the European Communities.

CEN, European Committee for Standardization.

CERCLA, Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

CFR, The Code of Federal Regulations contains the detailed regulations, written by Federal Agencies, to implement the provisions of laws passed by Congress. Regulations in the CFR are equivalent to Federal law.

CIDX, Chemical Industry Data Exchange.

CMEA, Council for Mutual Economic Assistance.

Compliance Checking, A checking process that is used to ensure that a transmission complies with ASC X12 syntax rules.

Component Data Element, An data element used as a sub-element in a Composite Data Structure.

Component Data Element Separator, Sometimes referred to as a sub-element separator. A unique character that precedes each Component Data Element in a Composite Data Structure. It is specified by the sender in the Interchange Control Header (ISA). The separator has a range of influence from this header to the next Interchange Control Trailer (IEA) segment. The sub-element must be different from the data element separator and segment terminator and once specified in the ISA segment must not appear in a data element value with the exception of its possible appearance in Data Element #785, Binary Data. Within diagrams, the colon (:) is used to represent the separator character. Within diagrams, the colon (:) is used to represent the separator character.

Composite Data Structure, Structure that consists of two or more logically related component data elements in a defined sequence and delimited by a Component Element Separator.

Condition Designator, An indicator assigned to each data element in a segment and defines how it is to be used in the segment. Data elements may be designated as Mandatory (M), Optional (O) or Relational (X). Refer to the ASC X12 Standards, X Segment Directory, Introduction.

Control Segment, A control segment has the same structure as a data segment but is used for transferring control information for grouping data segments. Control Segments are Loop Control Segments (L/LE), Transaction Set Control Segments (ST/SE), and Functional Group Control Segments (GS/GE), defined in X12.6 and Interchange Control Segments (ISA/IEA,TA1) defined in X12.5.

Control Validation, Confirmation that information within the control segments is correct.

Conventions, Common practices and/or interpretations of the use of the ASC X12 standards, complying with the standards, as agreed upon by two or more trading partners. Conventions define what is included in a specific implementation of an ASC X12 standard.

Data Element, The smallest unit of information in the X12. Data elements are defined in the Data Element Dictionary, X12.3. Each data element is identified by a reference number.

Data Element Dictionary, Source document for Data Element specifications. Its official name is X12.3 Data Element Dictionary. The dictionary specifies the name, description, and minimum/maximum length for each data element. For ID-type or code type data elements, the dictionary lists all code values and their definitions or indicates in an appendix where the valid code list can be obtained.

Data Element Length, Number of character positions available to represent the data element value. A data element may be of variable length with range from minimum to maximum, or it may be of fixed length in which the minimum is equal to the maximum.

Data Element Reference Number, Reference number assigned to each data element as a unique identifier. Numbers prefixed with a "C" or an "S" indicate a Composite Data Element. Lack of a prefix indicates indicate a Simple Data Element.

Data Element Separator, A unique character preceding each data element that is used to delimit data elements within a segment. It is specified by the sender in the Interchange Control Header (ISA). The separator has a range of influence from this header to the next Interchange Control Trailer (IEA) segment. The data element separator must be different from the component or sub-element data separator and segment terminator and once specified in the ISA segment must not appear in a data element value with the exception of its possible appearance in Data Element #785, Binary Data. Within diagrams, the asterisk (*) is used to represent the separator character. See "Delimiters".

Data Element Type, An identification which describes the format of the data in the element. A data element may be one of eight types: Numeric (N), Decimal (R), Identifier (ID), String (AN), Date (DT), Time (TM), Binary (B), or Fixed Length String (FS). Refer to X12.3 Data Element Dictionary, Introduction.

Delimiters, Delimiters are bit configurations that are used as data element separators, component or sub-element separators and segment terminators. The design of X12 is based on the concept of variable lengths. Delimiters are necessary to identify the start of data elements and sub-elements and to identify the end of segments. They are specified by the sender in the Interchange Control Header (ISA). They have a range of influence from this header to the next Interchange Control Trailer (IEA) segment. Delimiters are agreed upon by the Trading Partners. The instance of the terminator must be different from the instance of the data element separator which must be different from the component (sub-element) element separator. Once specified in the ISA segment they must not appear in a data element value with the exception of its possible appearance in Data Element #785, Binary Data.

DISA, Data Interchange Standards Association. A not-for-profit organization which serves as the Secretariat for ASC X12 and the Pan American EDIFACT Board(PAEB). It is accredited by ANSI to administer the U.S. Technical Advisory Group on matters pertaining to EDIFACT syntax before the International Organization for Standardization's(ISO's) Technical Committee 154.

Direct Transmission, The exchange of data from the computer of the sending party directly to the computer of the receiving party.

DOT, Department of Transportation.

Draft Standard for Trial Use (DSTU), A document approved by the full ASC X12 committee following membership consensus and subsequent resolution of negative votes and approved for publication by the Procedures Review Board. DSTU's must be submitted to ANSI periodically for approval as National Standards. See ANSI Standard.

EBCDIC, Extended binary-coded-decimal interchange code.

ECE, European Community of Economics (UN/ECE.)

EDI, The abbreviation for Electronic Data Interchange, which is commonly defined as "the computer-to-computer exchange of business information in a standard format." An EDI transmission is a highly structured message intended for automated processing by a computer. All references to EDI under U.S. EPA programs refers to the utilization of ASC X12 standards.

EDICC, Electronic Data Interchange Council of Canada.

EDIFACT, Electronic Data Interchange for Administration, Commerce, and Transport. (UN/EDIFACT.)

EDIFACT Board, Advisory and support team for a number of the UN/EDIFACT Rapporteur.

EDI Translation, The conversion of application data to and from the X12 standard format.

EDI Translator, Computer software used to perform the conversion of application data to and from the X12 standard format.

EDX, Electrical Data Exchange.

EIDX, Electronics Industry Data Exchange.

Electronic Data Interchange (EDI), The computer application to computer application exchange of business information in a standard format. An EDI transmission is a highly structured message intended for automated processing by a computer. All references to EDI under U.S. EPA programs refers to the utilization of ASC X12 standards.

Electronic Envelope, Electronic package that contains a set(s) of documents sent from one sender to one receiver. See Interchange Control Segments.

Electronic Mailbox, A repository where an EDI transmission is stored for pickup or delivery. Mail boxes may be within a third-party service provider's system or in an individual trading partner's domain.

Encryption, A process of transforming clear text (data in its original, uncoded form) into ciphertext (encrypted output of a cryptographic algorithm) for security or privacy.

EPA, The Environmental Protection Agency. Also called USEPA for United States Environmental Protection Agency. Established in 1970 by Presidential executive order, it brings together parts of various government agencies involved with the control of pollution. Note that some State environmental authorities may be called EPA also, as in Illinois EPA.

ESDX, Environmental and Safety Data Exchange.

FIPS PUB 161, Federal Information Processing Standard, Publication 161.

Functional Acknowledgment, A transaction set (997) transmitted by the receiver of an EDI transmission to the sender, indicating receipt and syntactical acceptability of data transmitted according to the ASC X12 standards. The functional acknowledgment allows the receiving party to report back to the sending party problems encountered by the syntax analyzer as the data is interpreted. It is not intended to serve as an acknowledgment of data content.

Functional Group, A group of one or more transaction sets enclosed by a Functional Group Header (GS) segment and a Functional Group Trailer (GE) segment. Each instance of a functional group applies to a specific business function defined by the specific application to which it applies.

Functional Group Envelope, The envelope starting with a GS (Functional Group Header) Element and terminated with a GE (Functional Group Trailer) Element.

GOSIP, Government Operations Systems Information Protocol

Guideline, A document prepared by an EDI implementor that defines the use of the ASC X12 standards in the implementor's environment.

Hexadecimal, Base 16 notation commonly used to represent binary values.

ICMS, Integrated Contract Management System. An automated procurement and contract management system integrated with a financial management system.

Implementation Guideline, A document prepared by an industry group, association, institute, government body or individual trading partner that defines how the ASC X12 standards are used by that industry.

Industry Conventions, A document prepared by an industry group, association, institute, etc. that defines how the ASC X12 standards are used by that industry.

Interchange, A transfer of data between trading partners.

Interchange Control Envelope, The outer envelope that holds multiple functional group envelopes in an ASC X12 transmission.

Interchange Control Segments, Segments that identify the boundaries of the ASC X12 formats in a transmission. Interchange Control Header (ISA) and Interchange Control Trailer (IEA) segments identify a unique interchange being sent from one sender to one receiver.

Interchange Control Structure, The Interchange Control Header (ISA) and Interchange Control Trailer (IEA) segments envelope one or more functional groups or interchange related control segments and perform the following functions: 1) defines the data element separators and the data segment terminators, 2) identifies the sender and receiver, 3) provides control information for the interchange, and 4) allows for authorization and security information. (X12.5).

Level, A term used to identify hierarchical positions in an ASC X12 design. The levels used from highest to lowest are Communications, EDI Interchange, Functional Group, Transaction Set, Heading Area, Summary Area and Detail Area. Reference ASC X12 publication DSTU X12.59 Implementation of EDI Structures - Semantic Impact.

Loop, A group of segments related only by design of the transaction set. Use of any segment within a loop requires the use of the first or parent segment of the loop.

Mandatory (M), A data element/segment requirement designator that indicates that the presence of a specified data element is required.

Mapping, The process of identifying the relationship between the data elements in the standard transaction set and the data elements in the application..

Max Use, The maximum number of times a segment can be used at the location in a transaction set.

Message, Entire data stream including the outer envelope.

NBFA, National Business Forms Association.

NEIC, National Environmental Investigation Center.

OPPE, Office of Policy, Planning, and Evaluation is an organization within the U.S. EPA.

Optional (O), A data element/segment requirement designator that indicates that the presence of a specified data element/segment is at the option of the sending party, which can be based on the mutual agreement of the interchange parties.

PIDX, Petroleum Industry Data Exchange.

Proprietary Format, A data format specific to a company, industry, or other limited group. Proprietary formats may not comply with the ASC X12 series of standards.

Qualifier, A data element that identifies or defines a related element. Qualifier elements are ID Type Elements. The qualifier is a code taken from a list of approved codes.

Rapporteur, The official UN/EDIFACT title given to the individual who is responsible within a regional UN/EDIFACT Board for the coordination of Message Development, Technical Assessment, Maintenance, Promotion and Documentation and Special Projects.

RCRA, The Resource Conservation and Recovery Act is the Federal statute that regulates the generation, treatment, storage, disposal or recycling of solid and hazardous waste.

Repeating Segment, A segment that may be used more than once at a given location in a transaction set. See Max Use.

SARA, The Superfund Amendments and Reauthorization Act of 1986.

Security, System screening that denies access to unauthorized users and protects data from unauthorized uses.

Segment, Variable length set of logically related data elements in a defined sequence, a unique segment identifier (which is not a data element), one or more data elements, each preceded by a data element separator, and a segment terminator. Refer to X Segment Directory.

Segment Directory (X), The standard that provides the definitions and specifications of the segments used in the construction of transaction sets developed by ASC X12. The directory lists each segment by name, purpose, identifier, the contained data elements in the specified order, and the requirement designator for each data element.

Segment Identifier, A unique identifier for a segment composed of a combination of two or three letters or digits. The segment identifier occupies the first character positions of the segment. The segment identifier is not a data element. The segment identifier in UN/EDIFACT is a component data element — part of a composite data element consisting of a segment identifier and an explicit looping designator.

Segment Terminator, A unique character appearing at the end of a segment to indicate the termination of the segment. It is specified by the sender in the Interchange Control Header (ISA). The segment terminator has a range of influence from this header to the next Interchange Control Trailer (IEA) segment. The segment terminator must be different from the data element and sub-element separators and once specified in the ISA segment must not appear in a data element value with the exception of its possible appearance in Data Element #785, Binary Data. Within diagrams, the notation "N/L" is used to represent the segment terminator.

Segment Directory (X), Provides the purposes and formats of the segments used in the construction of transaction sets. The directory lists each segment by name, purpose, identifier, the contained data elements in the specified order, and the requirement designator for each data element.

Segment Identifier, A unique identifier for a segment composed of a combination of two or three uppercase letters and digits. The segment identifier occupies the first character positions of the segment. The segment identifier is not a data element. The segment identifier in UN/EDIFACT ISA component data element—part of a composite data element consisting of a segment identifier and an explicit looping designator.

Standards, Standards are the technical documentation approved by ASC X12, including Transaction Sets, Segments, Data Elements, Codes and Interchange Control Structures. Standards provide the structure for ASC X12.

Sub Element Separator, Sometimes referred to as a Component Data Element Separator. A unique character that precedes each Component Data Element in a Composite Data Structure. It is specified by the sender in the Interchange Control Header (ISA). The separator has a range of influence from this header to the next Interchange Control Trailer (IEA) segment. The sub-element must be different from the data element separator and segment terminator and once specified in the ISA segment must not appear in a data element value with the exception of its possible appearance in Data Element #785, Binary Data. Within diagrams, the colon (:) is used to represent the separator character.

Syntax, The grammar or rules that define the structure of the EDI standards (i.e., the use of loops, qualifier, etc.). Syntax rules are published in ANSI X12.6.

Trading Partner, The sending and/or receiving party involved in the exchange of electronic data interchange transmissions.

Transaction Set, The transaction set unambiguously defines, in the standard syntax, information of business or strategic significance and consists of a transaction set header segment, one or more data segments in a specified order, and a transaction set trailer segment.

Transaction Set ID, An identifier that uniquely identifies the transaction set. This identifier is the first data element of the transaction set header segment.

Translation, The act of accepting documents in other than X12 standard format and converting them to the X12 standard format.

Transmission Control, Defines how information is transmitted across communications lines and includes routing and recommendations.

TSD Facility, A site for Treatment, Storage, and Disposal of hazardous waste.

UCC, Uniform Code Council.

UCS, Uniform Communication Standard.

UHWM, The shipping document that pertains to hazardous waste and is duly signed by the generator is called a Uniform Hazardous Waste Manifest, as set out in EPA Form 8700-22.

UNCID, Uniform Rules of Conduct For Interchange of Trade Data by Teletransmission.

VAN, Value Added Network. Third-party service organizations.

Version/Release, Identifies the publication of the standard being used for the generation or the interpretation of data in the X12 standard format. May be found in the Functional Group Header Segment (GS) and in the Interchange Control Header Segment (ISA). (E.g., Version 003040 means Version 3 Release 4.) See Control Segment.

VICS Committee, Voluntary Interindustry Communications Standards for Electronic Data Interchange.

WINS, Warehouse Industry National Standards guidelines.

X12, The ANSI committee responsible for the development and maintenance of standards for Electronic Data Interchange (EDI).

X12.5, Interchange Control Structures. This standard defines the control structures, the interchange envelope of a header (ISA) and trailer (IEA) for the electronic interchange through a data transmission, and it provides a structure to acknowledge the receipt and processing of this envelope.

X12.6, Application Control Structure. This standard defines the structure of business transactions for computer-to-computer interchange.

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 9 - FORMS AND DOCUMENTS

This section will be used only in the *EPA individual* EDI Project Implementation Guidelines to:

- C Identify the business documents to be communicated via EDI,
- C Identify the Transaction Sets selected to communicate the information,
- C Provide a matrix map of the information on the document to the ASC X12 segments, and
- C Provide for the inclusion of additional information pertinent to the successful implementation of the project.

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 10 - AGENCY CONVENTIONS, INTERCHANGE CONTROL & TRANSACTION SETS

10.1 Introduction

The conventions for Electronic Data Interchange communications with the U.S. Environmental Protection Agency (EPA) using ANSI ASC X12 formats are documented in this section. This publication provides only a generic description of the information necessary for communications. The detailed conventions for a specific project are documented in the Agency's Implementation Guideline Conventions used by that project.

Section 10 contains the descriptions of the information used in the Interchange Header (ISA), Interchange Trailer (IEA), Group Start (GS), Group End (GE), and the control segments. An example of a typical transaction set will also be described, listing the transaction set as it appears in the standards manual with the segments that are to be used shown shaded. This is followed by the details of each segment shown on individual pages that detail the data elements, including codes or qualifiers that are required.

To help understand how the standards work, it is useful to begin by defining some terminology and explaining some of the components that make electronic communications possible. It is important to note that in the transaction set implementation guidelines all text shown in italics is an EPA Convention. Non-italicized text contain definitions and comments directly from the X12 standards.

A "*transaction set*" is the term used in business data interchange to describe the electronic transmission of a single document (purchase order, Discharge Monitoring Report, shipping notice, etc.) between one organization's computer and the computer of the other trading partner. The data included in a transaction set conveys the same information as a conventional printed document.

A *transaction set* generally but not always, consists of three areas - Header or Table 1, Detail or Table 2, and a Summary or Table 3. The *Header Area* contains information that is of an administrative nature and pertains to the entire document (document dates, identities, names of contacts, etc.). The *Detail Area* is used to convey the actual business transaction such as quantities, prices, items. Data in the Detail Area overrides equivalent Header Area data (i.e. if a contact is specified in the Header and another contact is specified with a single item, the second contact takes priority). The *Summary Area* contains control information and may contain other data that relates to the entire transaction.

Transaction sets are a collection of a series of segments. A *segment* is a group of data used to convey a logical grouping of data. The data within a segment is contained within data elements. A segment is the smallest discrete piece of data in the ASC X12 design.

Please note that in the design of Composite Data Elements, sub-elements are still referred to as elements.

EDI transmissions are created from information extracted from internal information systems, translated into ASC X12 format and punctuated with control characters. Quantity, unit of measure, unit price, catalogue number is typical purchase order or invoice information. In an invoice transaction the information becomes a segment if five data elements grouped in a specific sequence as follows:

IT1Quantity*Unit of Measure Code*Unit Price** Product
Service Qualifier*Product/Service Identification N/L**

The ASC X12 format requires each element be separated by an element separator and the last element be followed by a segment terminator. Graphic representations of the control characters usually use the asterisk as a element separator, N/L as the segment terminator and a colon(:) as a sub-element separator.

The segment in an actual transmission would appear as:

IT11*CA*1.08**CT*141151 N/L**

In the ASC X12 code list "CA" is the unit of measure code for case, and "CT" is the product identification qualifier for carton.

The following list identifies terms associated with data segments and provides references to codes and terms used in the X12 standard. The actual transmission does not include all of the listed items as only the segment identifier characters, the values for each data element, the data element separators and the segment terminator characters are transmitted.

Segment Identifier, Two or three characters assigned to identify the segment. The identifier occupies the first character positions of the segment.

Data Element Reference Number, A number assigned to the data element to provide a reference to the ASC X12 Data Dictionary which defines specifications for each data element.

Data Element Reference Designator, A structured code assigned to each data element in a segment to indicate its unique position in the segment. It is composed of the segment identifier and its sequential position within the segment.

Data Element Name, This is the name assigned to the data element in the ASC X12 Data Dictionary.

Attributes, Each data element has three ASC X12 attributes: element usage or Condition Designator, data element type, and Minimum/Maximum length.

Condition Designator

M - Mandatory

The element is required to appear in the segment.

O - Optional

Appearance of the data element is at the option of the sending party or is based on the mutual agreement of the trading partners.

X - Relational

Condition that may exist between two or more data elements based on the presence or absence of one of the data elements. Additional codes are used to identify the condition i.e. P - Paired or Multiple, R - Required, E - Exclusion, C - Conditional, or L - list Conditional. Refer to the X12 Standards Manual, Introduction to X12.22 Segment Directory.

Data Element Type

ID Identifier

The data element must always contain a value from a predefined list of values that is maintained by X12 or by other bodies that are recognized by X12 and identified by reference in Appendix A in the Data Element Dictionary. The value is left justified. Trailing spaces should be suppressed.

AN String

Alpha-numeric sequence of characters containing at least one non-space character. The significant characters must be left justified. Leading spaces, if used are assumed to be significant characters. Trailing spaces should be suppressed.

FS Fixed Length String

A sequence of any letters, spaces, and/or special characters with spaces filled, if necessary, to satisfy minimum length.

DT Date

The format is YYMMDD where YY is the Year, MM is the month and DD is the day of the month.

TM Time

Values for a time-type data element are in the HHMMSSd.d format expressed using the 24-hour clock. HH expresses the hour(00-23), MM expresses the minute(00-59), SS the seconds(00-59), and d.d is the numeric expression of decimal seconds.

Nn Numeric

Numeric data element where N indicates a numeric and "n" indicates the decimal places to the right of a fixed, implied decimal point. The decimal point is not transmitted in the character stream. If the max length of the data element was five position and the Type was N2, the values sent would always have two decimal positions; an N0 would contain no decimal positions.

R Decimal

A numeric data element where the decimal point is optional for integer values, but required for fractional values. Leading zeros should be suppressed unless necessary to satisfy a minimum length requirement. The decimal point and the minus sign when transmitted are not counted when determining the length of the data element value. If the max length of the data element was three positions, the following represent the values that could be sent: NNN, .NNN, N.NN, NN.N, -N.NN, etc.

B Binary

Any sequence of octets ranging in value from binary 00000000 to binary 11111111. Binary may only exist in the BIN Segment.

Minimum/Maximum, This is the range, minimum to maximum, of the number of character positions available to represent the data element value. It may be of variable length with a minimum to maximum, or it may be of fixed length in which the minimum is equal to the maximum.

10.2 X12 EDI Transmission Control Structure

The X12 Transmission is a hierarchical structure of headers and trailers to allow transaction sets of different types to be transmitted in the same transmission and allows the data to be separated or segregated logically for easy interpretation and internal routing by the receiver.

Transaction sets begin with an ST segment and end with an SE segment. Multiple transaction sets of the same functional group are transmitted together beginning such a group with a GS (Group Start) and ending with a GE (Group End) segment. One or more functional groups are bound together for transmission within an interchange envelope that starts with an ISA segment and ends with an IEA segment. There are other segments available for Security and Interconnect control when using the services of third party communications providers (VANS).

The *interchange control structure* is the interchange envelope consisting of a Header (ISA) and a Trailer (IEA) for the electronic interchange through a data transmission, and provides a structure to acknowledge the receipt and processing of the envelope.

The ISA and the IEA envelope one or more functional groups or interchange-related control segments and perform the following functions:

- C Define the segment terminator, and the element and sub-element separators.
- C Identify the sender and receiver,
- C Provide control information for the interchange, and
- C Allow for authorization and security information.

The X12 standard also provides an interchange acknowledgment segment to be used to acknowledge a transmission's Header and Trailer. It may be used to report the success of the syntactical analysis of the ISA/IEA. This is not the Functional Acknowledgment.

The GS and GE envelope transactions sets of the same type. Each type of transaction is contained in a separate Functional Group to allow the receiver to parse the information to the appropriate application. The GS segment provides the identity of the Version and Release of the standard used to create the transaction. Both the GS and the GE provide control information to ensure the validity of the interchange.

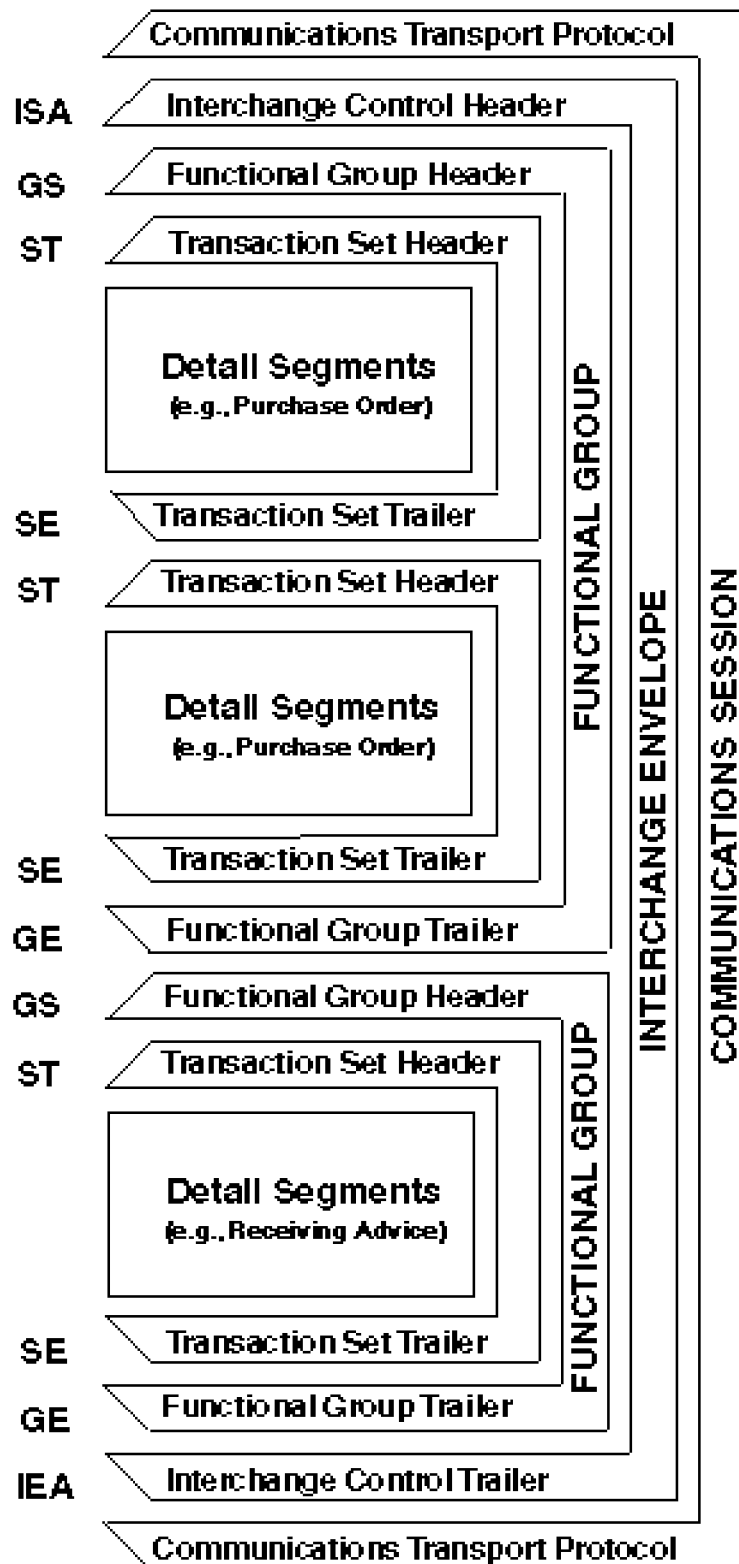
Every transaction set begins with an ST (Transaction Start) segment and is ended with a GE (Group End) segment.

Translators normally strip off the ISA/IEA and GS/GE segments during translation. It is the responsibility of the trading partners to make provisions to archive the transmissions before and after translation to satisfy EDI Audit Requirements.

The structures of the transaction set and functional group headers and trailers are found in the Segment Directory. The structures of the interchange control header and trailer are found in the Interchange Control Structure Standard (dpANS X12.5-1989).

See the following EDI Transmission schematic. The schematic illustrates a typical format for electronically transmitting a series of diverse business transactions.

Schematic of an EDI Transmission



EDI Transmission Structure

10.2.1 Control Segments

Segment: **ISA Interchange Control Header**

Purpose: To start and identify an interchange of one or more functional groups and interchange-related control segments.

Notes: The actual value of the data element separator, the sub-element separator, and the segment terminator for all the segments following this ISA (that starts this communication) thru the IEA (that completes the transmission) are established in the ISA. Byte 4, following the three bytes that comprise the ISA (the identification of this header) will be used to separate the remaining elements in this and all succeeding data elements thru the end of the IEA. This implementation guide will use the asterisk (*) as the graphic representation of the data element separator. The sub-element separator is established in data element I15. It also will be the sub-element separator thru the end of the IEA. This implementation guideline will use the colon (:) as the graphic representation of the sub-element separator. The value at the last position of the ISA establishes the segment terminator for the communication thru the end of the IEA. The ISA consists of fixed length fields, therefore the segment terminator will be the 106 byte or the first byte after data element ISA16.

The control characters selected as the segment separator, sub-element separators and the segment terminators must be characters that will not be data characters within the communication. Acceptable characters, in hexadecimal notation are HEX 04, HEX 0D, HEX 4F, HEX 1C, or HEX 15. Refer to the individual EPA implementation guidelines for the appropriate control characters.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA01	I01	Authorization Information Qualifier	M, ID, 2/2
		Code to identify the type of information in the Authorization information. 00 No Authorization Information Present (No meaningful information in I02) 03 Application Routing Reference	
ISA02	I02	Authorization Information	M, AN, 10/10
		Information used for additional identification or authorization of the of the sender or the data in the interchange. The type of information is set by the Authorization Information Qualifier.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref. Des.</u>	<u>Data Element</u>	<u>Name</u>	<u>Attributes</u>
ISA03	I03	Security Information Qualifier	M, ID, 2/2
		Code to identify the type of information in the Security Information	
		00 No Security Information Present (No Meaningful Information in I04)	
		01 Password	
ISA04	I04	Security Information	M, AN, 10/10
		This is used for identifying the security information about the sender or the data in the interchange. The type of information is set by the Security Information Qualifier.	
ISA05	I05	Interchange ID Qualifier	M, ID, 2/2
		Qualifier to designate the system/method of code structure used to designate the sender or receiver ID element being qualified.	
		01 Duns (Dun & Bradstreet)	
		09 X.121 (CCITT)	
		14 Duns Plus Suffix	
ISA06	I06	Interchange Sender ID	M, ID, 15/15
		Identification code published by the sender for other parties to use as the receiver ID to route data to them. The sender always codes this number in the sender ID element.	
ISA07	I05	Interchange ID Qualifier	M, ID, 2/2
		Qualifier to designate the system/method of code structure used to designate the sender or receiver ID element being qualified.	
		01 Duns (Dun & Bradstreet)	
		09 X.121 (CCITT)	
		14 Duns Plus Suffix	
ISA08	I07	Interchange Receiver ID	M, ID, 15/15
		Identification code published by the receiver of the data. When sending, it is used by the sender as their sending ID, thus other parties sending to them will use this as a receiving ID to route data to them.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA09	I08	Interchange Date Date of the interchange.	M, DT, 6/6
ISA10	I09	Interchange Time Time of the interchange.	M, TM, 4/4
ISA11	I10	Interchange Control Standards Identifier Code to identify the agency responsible for the control standard used by the message that is enclosed by the interchange header and trailer. U U.S. EDI Community of ASC X12, TDCC, and UCS	M, ID, 1/1
ISA12	I11	Interchange Control Version Number This version number establishes the interchange control segment version and release. Refer to the individual EPA implementation guidelines for the appropriate information. It does not establish the Version/Release for the transactions which follow. That Version/Release is established by the GS (Functional Group Header) preceding the transactions. 00302 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1991 00303 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1992 00304 Draft Standard for Trial Use Approved for Publication by ASC X12 Procedures Review Board Through October 1993	M, ID, 5/5
ISA13	I12	Interchange Control Number This number uniquely identifies the interchange data to the sender. It is assigned by the sender. Together with the sender ID it uniquely identifies the interchange data to the receiver. It is suggested that the sender, receiver, and all third parties be able to maintain an audit trail or interchanges using this number. The number is suggested to start with 000000001 and be incremented by 1 for each subsequent ISA between the sender and receiver. It must match the number in IEA02.	M, NO, 9/9

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ISA14	I13	Acknowledgment Requested Code sent by the sender to request an interchange acknowledgment. Refer to the individual EPA project guidelines. 0 No Acknowledgment Requested 1 Acknowledgement Requested	M, ID, 1/1
ISA15	I14	Test Indicator Code to indicate whether data enclosed by this interchange envelope is test or production. P Production Data T Test Data	M, ID, 1/1
ISA16	I15	Sub-element Separator	M, AN, 1/1

Note: ISA16 is followed by a character that will establish the segment terminator for the balance of the communication, thru the end of the IEA. Refer to the Notes at the start of this segment.

Segment: **IEA Interchange Control Trailer****Purpose:** To define the end of an interchange of one or more functional groups and interchange-related control segments.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
IEA01	I16	Number of Included Functional Groups	M, N0, 1/5
		A count of the number of functional groups included in a transmission.	
IEA02	I12	Interchange Control Number	M, N0, 9/9
		This number uniquely identifies the interchange data to the sender. It is assigned by the sender. Together with the sender ID it uniquely identifies the interchange data to the receiver. It is suggested that the sender, receiver, and all third parties be able to maintain an audit trail of interchanges using this number. This number must agree with the number is ISA12.	

Segment: GS Functional Group Header

Purpose: To indicate the beginning of a functional group and to provide control information.

Syntax: 1 The data interchange control number (GS06) in this header must be identical to the same data element in the associated Functional Group Trailer (GE02).

Comments: A A functional group of related transaction sets, within the scope of X12 standards, consists of a collection of similar transaction sets enclosed by a functional group header and a functional group trailer.

Notes: The GS establishes the Version/Release for the transaction sets between it and the GE (Group End).

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GS01	479	Functional Identifier Code	M, ID, 2/2
		Code identifying a group of application related Transaction Sets. Listed below are examples. Refer to the individual EPA implementation guidelines for the appropriate codes.	
		FA Functional Acknowledgement (997)	
		IN Invoice Information (810, 819)	
		PC Purchase Order Change (860)	
		PO Purchase Order Transaction (850)	
		PR Purchase Order Acknowledgment (855)	
		PS Planning Schedule with Release Capability (830)	
		RT Report of Test Results (863)	
GS02	142	Application Sender's Code	M, AN, 2/15
		Code identifying party sending transmission. Codes agreed to by trading partners.	
GS03	124	Application Receiver's Code	M, AN, 2/15
		Code identifying party receiving transmission. Codes agreed to by trading partners.	
GS04	29	Group Date	M, DT, 6/6
		Date sender generated a functional group of transaction sets.	

EPA EDI IMPLEMENTATION GUIDELINE

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GS05	30	Group Time	M, TM, 4/4
		Time (HHMM) when the sender generated a functional group of transaction sets (local time at sender's location).	
GS06	28	Group Control Number.	M, N0, 1/9
		Start with 000000001 and increment by 0000000001 for each subsequent GS in the communication.	
		Assigned number originated and maintained by the sender.	
GS07	455	Responsible Agency Code	M, ID, 1/2
		Code used in conjunction with Data Element 480 to identify the issuer of the standard.	
		X Accredited Standards Committee X12	
GS08	480	Version/Release/Industry ID Code	M, ID, 1/12
		Code indicating the version, release, sub-release and industry (Agency) identifier of the EDI standard being used. Positions 1-3, version number; positions 4-6, release and sub-release level of version; positions 7-12, industry, Agency or trade association identifier (optionally assigned by user).	
		Refer to the individual EPA implementation Guidelines for the appropriate code.	

Segment: GE Functional Group Trailer**Purpose:** To indicate the end of a functional group and to provide control information.**Syntax:** 1 The data interchange control number (GE02) in this trailer must be identical to the same data element in the associated Functional Group Header (GS06).**Comments:** A The use of identical data interchange control number in the associated functional group header and trailer is designed to maximize functional group integrity. The control number is the same as that used in the corresponding header.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
GE01	97	Number of Transaction Sets Included Total number of transaction sets included in the functional group or interchange (transmission) group terminated by the trailer containing this data element.	M, N0, 1/6
GE02	28	Group Control Number Assigned number originated and maintained by the sender. It must be identical to the number in the Group Header(GS).	M, N0, 1/9

Segment: ST Transaction Set Header**Purpose:** To indicate the start of a transaction set and to assign a control number**Comments:** The transaction set identifier (ST01) is intended for use by the translation routines of the interchange partners to select the appropriate transaction set definition (e.g., 810 selects the invoice transaction set).

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
ST01	143	Transaction Set Identifier Code.	M, ID, 3/3
		Refer to the individual EPA implementation guidelines for the appropriate codes.	
		Code uniquely identifying a transaction set.	
		810	X12.2 Invoice
		820	X12.4 Remittance/Payment Advice
		830	X12.14 Planning Schedule
		848	X12.36 Material Safety Data Sheet
		850	X12.1 Purchase Order
		855	X12.9 Purchase Order Acknowledgment
		860	X12.15 Purchase Order Change
		863	X12.41 Report of Test Results
		865	X12.16 Purchase Order Change
Acknowledgment		997	X12.20 Functional Acknowledgment
ST02	329	Transaction Set Control Number	M, AN, 4/9
		Identifying control number assigned by the originator for a transaction set.	
		A number to uniquely identify transaction set sequence within a functional group. Start with 0001 for the first transaction set and increment by 001 for each transaction set within a functional group. This value must agree with the value in SE02.	

Segment: **SE** Transaction Set Trailer

Purpose: To indicate the end of the transaction set and provide the count of the transmitted segments (including the beginning (ST) and ending (SE) segments).

Comments: SE is the last segment of each transaction set.

Data Element Summary

<u>Ref.</u> <u>Des.</u>	<u>Data</u> <u>Element</u>	<u>Name</u>	<u>Attributes</u>
SE01	96	Number of Included Segments	M, N0, 1/6
		Total number of segments included in a transaction set including ST and SE segments.	
SE02	329	Transaction Set Control Number	M, AN, 4/9
		Identifying control number assigned by the originator for a transaction set.	

APPENDIX A

A.1 Standard Convention

The individual EPA Project Implementation Guidelines contain appendices that describe the transaction set mappings and examples of the business information communicated. There is one appendix for each transaction set used by the project. The Version/Release for each transaction used by the individual projects will be in the applicable EDI Project Implementation Guideline.

Refer questions to the EPA EDI Coordinator of the Program Office responsible for the project.

THIS PAGE LEFT INTENTIONALLY BLANK